Ham-Space Digest   Sun, 24 Oct 93   Volume 93 : Issue   65

Today's Topics:
                        ORBS$295.2L
                   ORBS$295.MICRO.AMSAT
                   ORBS$295.MISC.AMSAT
                   ORBS$295.OSCAR.AMSAT
                    ORBS$295.WT.AMSAT
              Using Shuttle Elements in ephem (2 msgs)

We trust that readers are intelligent enough to realize that all text
herein consists of personal comments and does not represent the official
policies or positions of any party. Your mileage may vary. So there.

Date: Fri, 22 Oct 1993 18:05:00 MDT
From: elroy.jpl.nasa.gov!usc!yeshua.marcam.com!zip.eecs.umich.edu!destroyer!
nntp.cs.ubc.ca!alberta!nebulus!ve6mgs!usenet@ames.arpa
Subject: ORBS$295.2L
To: ham-space@ucsd.edu

SB KEPS @ AMSAT $ORBS-295.N
2Line Orbital Elements 295.AMSAT

HR AMSAT ORBITAL ELEMENTS FOR AMATEUR SATELLITES IN NASA FORMAT
FROM WA5QGD FORT WORTH,TX October 22, 1993
BID: $ORBS-295.N

DECODE 2-LINE ELSETS WITH THE FOLLOWING KEY:
1 AAAAAU 00 0 0 BBBBB.BBBBBBBB .CCCCCCCC 00000-0 00000-0 0 DDDZ
2 AAAAA EEE.EEEE FFF.FFFF GGGGGGG HHH.HHHH III.IIII JJ.JJJJJJJJKKKKKZ
KEY: A-CATALOGNUM B-EPOCHTIME C-DECAY D-ELSETNUM E-INCLINATION F-RAAN

G-ECCENTRICITY H-ARGPERIGEE I-MNANOM J-MNMOTION K-ORBITNUM Z-CHECKSUM

TO ALL RADIO AMATEURS BT

```
AO-10
1 14129U 83058B   93279.33702867 -.00000081  00000-0  10000-3 0   824
2 14129  27.1481   2.4799 6019419 119.8710 312.5993  2.05881755 77546
UO-11
1 14781U 84 21  B 93290.08412027  .00000274  00000-0  50594-4 0  6035
2 14781  97.8032 311.0490 0011570 334.0183  26.0441 14.69068128514615
RS-10/11
1 18129U 87 54  A 93290.06201884  .00000043  00000-0  40717-4 0  8031
2 18129  82.9270 148.5516 0011614 346.1410  13.9473 13.72324107316561
AO-13
1 19216U 88 51  B 93291.97902075 -.00000112  00000-0  30938-2 0  8038
2 19216  57.9233 288.8083 7215023 326.4503   3.7960  2.09724992 40957
FO-20
1 20480U 90 13  C 93286.05864589 -.00000014  00000-0 -22763-5 0  6012
2 20480  99.0206 119.8565 0540673 179.4597 180.7200 12.83221389172438
AO-21
1 21087U 91  6  A 93294.05409391  .00000057  00000-0  53777-4 0  3597
2 21087  82.9442 319.6850 0036471  32.4253 327.9130 13.74526370136734
RS-12/13
1 21089U 91  7  A 93292.06028196  .00000012  00000-0  61443-5 0  6043
2 21089  82.9254 190.2557 0030765  60.2849 300.1362 13.74027733135530
ARSENE
1 22654U 93031  B 93291.00444059  .00000000  00000-0  99999-4 0  5282
2 22654 001.3462 116.7185 2926141 157.0144 219.0546 01.42202871002302
UO-14
1 20437U 90  5  B 93294.17819869  .00000084  00000-0  40432-4 0  9041
2 20437  98.6076  17.0234 0011031 169.3749 190.7673 14.29797986195433
AO-16
1 20439U 90  5  D 93291.23406536  .00000055  00000-0  29168-4 0  7049
2 20439  98.6147  15.1060 0011212 178.7520 181.3697 14.29854858195021
DO-17
1 20440U 90  5  E 93294.22052761  .00000082  00000-0  39467-4 0  7043
2 20440  98.6150  18.3069 0011374 169.2905 190.8528 14.29992505195460
WO-18
1 20441U 90  5  F 93293.77202168  .00000079  00000-0  38439-4 0  7056
2 20441  98.6153  17.8815 0011930 171.0347 189.1050 14.29970770195401
LO-19
1 20442U 90  5  G 93291.73689884  .00000079  00000-0  38137-4 0  7049
2 20442  98.6158  16.0691 0012313 176.5723 183.5546 14.30062069195126
UO-22
1 21575U 91 50  B 93292.12954494  .00000093  00000-0  38553-4 0  4049
2 21575  98.4601   6.1819 0006983 294.2221  65.8240 14.36857525118464
KO-23
1 22077U 92 52  B 93292.44454846  .00000000  00000-0  99999-4 0  3016
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2 22077  66.0843  64.0300 0003238 352.2623   7.8344 12.86281279 55821
AO-27
1 22825U 93 61  C 93292.20664361  .00000081  00000-0  41041-4 0  2043
2 22825  98.6801   5.1308 0008356 187.8461 172.2658 14.27584941  3297
IO-26
1 22826U 93 61  D 93291.43407526  .00000053  00000-0  29566-4 0  2054
2 22826  98.6791   4.3653 0008790 191.9871 168.1093 14.27686814  3191
KO-25
1 22830U 93 61  H 93293.18077098  .00000069  00000-0  35864-4 0  2055
2 22830  98.5788   5.8953 0012182 157.1178 203.0570 14.28010481  3443
NOAA-9
1 15427U 84123  A 93290.74612187 -.00000037  00000-0 -93954-5 0  6057
2 15427  99.0870 332.9651 0014954 179.9226 180.2097 14.13554165456087
NOAA-10
1 16969U 86 73  A 93290.82106501  .00000122  00000-0  60766-4 0  5047
2 16969  98.5150 302.1917 0012934 321.7010  38.3214 14.24837161368080
MET-2/17
1 18820U 88  5  A 93291.53530170  .00000081  00000-0  66377-4 0  2038
2 18820  82.5391 100.8136 0017013 135.7781 224.4741 13.84695921288912
MET-3/2
1 19336U 88 64  A 93291.49527421  .00000043  00000-0  99999-4 0  2030
2 19336  82.5404 134.7206 0017389 143.8562 216.3716 13.16961690251441
NOAA-11
1 19531U 88 89  A 93290.89200958  .00000186  00000-0  12097-3 0  4044
2 19531  99.1481 269.2092 0012760  92.8710 267.3840 14.12923624261009
MET-2/18
1 19851U 89 18  A 93291.60222170  .00000077  00000-0  63957-4 0  2041
2 19851  82.5195 336.5279 0013850 179.8525 180.2646 13.84346937234267
MET-3/3
1 20305U 89 86  A 93293.86376909  .00000043  00000-0  99999-4 0  9058
2 20305  82.5526  76.2083 0016064 158.9218 201.2569 13.16023577191637
MET-2/19
1 20670U 90 57  A 93291.36526602  .00000000  00000-0 -50828-5 0  7043
2 20670  82.5469  40.5451 0017260 103.8993 256.4088 13.84178196167161
FY-1/2
1 20788U 90 81  A 93294.21136422  .00000354  00000-0  25783-3 0  8091
2 20788  98.8528 316.8038 0014727 321.8497  38.1620 14.01313955160235
MET-2/20
1 20826U 90 86  A 93292.63746333  .00000072  00000-0  59555-4 0  7047
2 20826  82.5268 337.3746 0013989   7.5076 352.6291 13.83561622154497
MET-3/4
1 21232U 91 30  A 93292.47380663  .00000043  00000-0  99999-4 0  6055
2 21232  82.5446 339.7727 0014438  70.5573 289.7107 13.16457107119680
NOAA-12
1 21263U 91 32  A 93290.85535603  .00002015  00000-0  92270-3 0  8098
2 21263  98.6440 318.6746 0012273 215.7022 144.3325 14.22324821126073
MET-3/5
1 21655U 91 56  A 93291.44033584  .00000044  00000-0  99999-4 0  6045
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2 21655  82.5517 287.4690 0014163  81.8750 278.3976 13.16824002104643
MET-2/21
1 22782U 93 55  A 93289.84654493  .00000030  00000-0  21875-4 0  2035
2 22782  82.5486  39.2666 0022321 183.8424 176.2567 13.82986914  6458
MIR
1 16609U 86 17  A 93291.95673353  .00008910  00000-0  12144-3 0  5202
2 16609  51.6178 317.6411 0006306 324.5715  35.4861 15.58350429438427
HUBBLE
1 20580U 90 37  B 93293.91470128  .00000889  00000-0  76642-4 0  3529
2 20580  28.4715 333.8899 0004289 286.5831  73.4285 14.92878594190313
GRO
1 21225U 91027B    93294.72918048  .00016652  00000-0  18166-3 0  2108
2 21225  28.4594  93.6599 0078136 141.7475 179.0070 15.57803766 20061
UARS
1 21701U 91 63  B 93292.47565775  .00002831  00000-0  26959-3 0  4017
2 21701  56.9850  43.4931 0005228  80.2682 279.7906 14.96252611114893
POSAT
1 22829U 93 61  G 93289.11726978  .00000072  00000-0  37231-4 0  2042
2 22829  98.6763   2.0610 0010043 184.4594 175.6498 14.27975951  2862
/EX
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SB KEPS @ AMSAT $ORBS-295.D
Orbital Elements 295.MICROS

HR AMSAT ORBITAL ELEMENTS FOR THE MICROSATS
FROM WA5QGD FORT WORTH,TX October 22, 1993
BID: $ORBS-295.D
TO ALL RADIO AMATEURS BT

Satellite: UO-14
Catalog number: 20437
Epoch time: 93294.17819869
Element set: 904
Inclination: 98.6076 deg
RA of node: 17.0234 deg
Eccentricity: 0.0011031
Arg of perigee: 169.3749 deg
Mean anomaly: 190.7673 deg
Mean motion: 14.29797986 rev/day
Decay rate: 8.4e-07 rev/day^2

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Epoch rev:               19543
Checksum: 348

Satellite: AO-16
Catalog number: 20439
Epoch time:       93291.23406536
Element set:      704
Inclination: 98.6147 deg
RA of node:        15.1060 deg
Eccentricity: 0.0011212
Arg of perigee:   178.7520 deg
Mean anomaly:     181.3697 deg
Mean motion:    14.29854858 rev/day
Decay rate:        5.5e-07 rev/day^2
Epoch rev:               19502
Checksum: 301

Satellite: DO-17
Catalog number: 20440
Epoch time:       93294.22052761
Element set:      704
Inclination: 98.6150 deg
RA of node:        18.3069 deg
Eccentricity: 0.0011374
Arg of perigee:   169.2905 deg
Mean anomaly:     190.8528 deg
Mean motion:    14.29992505 rev/day
Decay rate:        8.2e-07 rev/day^2
Epoch rev:               19546
Checksum: 310

Satellite: WO-18
Catalog number: 20441
Epoch time:       93293.77202168
Element set:      705
Inclination: 98.6153 deg
RA of node:        17.8815 deg
Eccentricity: 0.0011930
Arg of perigee:   171.0347 deg
Mean anomaly:     189.1050 deg
Mean motion:    14.29970770 rev/day
Decay rate:        7.9e-07 rev/day^2
Epoch rev:               19540
Checksum: 306

Satellite: LO-19
Catalog number: 20442
Epoch time:       93291.73689884
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Element set:      704
Inclination: 98.6158 deg
RA of node:       16.0691 deg
Eccentricity: 0.0012313
Arg of perigee:   176.5723 deg
Mean anomaly:     183.5546 deg
Mean motion:   14.30062069 rev/day
Decay rate:       7.9e-07 rev/day^2
Epoch rev:           19512
Checksum: 319

Satellite: UO-22
Catalog number: 21575
Epoch time:      93292.12954494
Element set:      404
Inclination: 98.4601 deg
RA of node:        6.1819 deg
Eccentricity: 0.0006983
Arg of perigee:   294.2221 deg
Mean anomaly:      65.8240 deg
Mean motion:   14.36857525 rev/day
Decay rate:       9.3e-07 rev/day^2
Epoch rev:           11846
Checksum: 310

Satellite: KO-23
Catalog number: 22077
Epoch time:      93292.44454846
Element set:      301
Inclination: 66.0843 deg
RA of node:       64.0300 deg
Eccentricity: 0.0003238
Arg of perigee:   352.2623 deg
Mean anomaly:       7.8344 deg
Mean motion:   12.86281279 rev/day
Decay rate:       .00000000 rev/day^2
Epoch rev:            5582
Checksum: 265

Satellite: AO-27
Catalog number: 22825
Epoch time:      93292.20664361
Element set:      204
Inclination: 98.6801 deg
RA of node:        5.1308 deg
Eccentricity: 0.0008356
Arg of perigee:   187.8461 deg
Mean anomaly:     172.2658 deg
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Mean motion:    14.27584941 rev/day
Decay rate:         8.1e-07 rev/day^2
Epoch rev:              329
Checksum: 303

Satellite: IO-26
Catalog number: 22826
Epoch time:      93291.43407526
Element set:      205
Inclination: 98.6791 deg
RA of node:          4.3653 deg
Eccentricity: 0.0008790
Arg of perigee:   191.9871 deg
Mean anomaly:     168.1093 deg
Mean motion:    14.27686814 rev/day
Decay rate:         5.3e-07 rev/day^2
Epoch rev:              319
Checksum: 318

Satellite: KO-25
Catalog number: 22830
Epoch time:      93293.18077098
Element set:      205
Inclination: 98.5788 deg
RA of node:          5.8953 deg
Eccentricity: 0.0012182
Arg of perigee:   157.1178 deg
Mean anomaly:     203.0570 deg
Mean motion:    14.28010481 rev/day
Decay rate:         6.9e-07 rev/day^2
Epoch rev:              344
Checksum: 297

/EX

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Date: Fri, 22 Oct 1993 18:02:00 MDT
From: yeshua.marcam.com!zip.eecs.umich.edu!destroyer!nntp.cs.ubc.ca!alberta!
nebulus!ve6mgs!usenet@uunet.uu.net
Subject: ORBS$295.MISC.AMSAT
To: ham-space@ucsd.edu

SB KEPS @ AMSAT  $ORBS-295.M
Orbital Elements  295.MISC

HR AMSAT ORBITAL ELEMENTS FOR MANNED AND MISCELLANEOUS SATELLITES
FROM WA5QGD FORT WORTH,TX October 22, 1993
```

BID: $ORBS-295.M
TO ALL RADIO AMATEURS BT

Satellite: MIR
Catalog number: 16609
Epoch time: 93291.95673353
Element set: 520
Inclination: 51.6178 deg
RA of node: 317.6411 deg
Eccentricity: 0.0006306
Arg of perigee: 324.5715 deg
Mean anomaly: 35.4861 deg
Mean motion: 15.58350429 rev/day
Decay rate: 8.910e-05 rev/day^2
Epoch rev: 43842
Checksum: 303

Satellite: HUBBLE
Catalog number: 20580
Epoch time: 93293.91470128
Element set: 352
Inclination: 28.4715 deg
RA of node: 333.8899 deg
Eccentricity: 0.0004289
Arg of perigee: 286.5831 deg
Mean anomaly: 73.4285 deg
Mean motion: 14.92878594 rev/day
Decay rate: 8.89e-06 rev/day^2
Epoch rev: 19031
Checksum: 343

Satellite: GRO
Catalog number: 21225
Epoch time: 93294.72918048
Element set: 210
Inclination: 28.4594 deg
RA of node: 93.6599 deg
Eccentricity: 0.0078136
Arg of perigee: 141.7475 deg
Mean anomaly: 179.0070 deg
Mean motion: 15.57803766 rev/day
Decay rate: 1.6652e-04 rev/day^2
Epoch rev: 2006
Checksum: 315

Satellite: UARS
Catalog number: 21701
Epoch time: 93292.47565775

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Element set:     401
Inclination: 56.9850 deg
RA of node:      43.4931 deg
Eccentricity: 0.0005228
Arg of perigee:    80.2682 deg
Mean anomaly:     279.7906 deg
Mean motion:   14.96252611 rev/day
Decay rate:      2.831e-05 rev/day^2
Epoch rev:          11489
Checksum: 309

Satellite: POSAT
Catalog number: 22829
Epoch time:      93289.11726978
Element set:     204
Inclination: 98.6763 deg
RA of node:       2.0610 deg
Eccentricity: 0.0010043
Arg of perigee:   184.4594 deg
Mean anomaly:     175.6498 deg
Mean motion:   14.27975951 rev/day
Decay rate:       7.2e-07 rev/day^2
Epoch rev:            286
Checksum: 317

/EX

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Date: Fri, 22 Oct 1993 17:40:00 MDT
From: destroyer!nntp.cs.ubc.ca!alberta!nebulus!ve6mgs!usenet@uunet.uu.net
Subject: ORBS$295.OSCAR.AMSAT
To: ham-space@ucsd.edu

SB KEPS @ AMSAT  $ORBS-295.O
Orbital Elements  295.OSCAR

HR AMSAT ORBITAL ELEMENTS FOR OSCAR SATELLITES
FROM WA5QGD FORT WORTH,TX October 22, 1993
BID: $ORBS-295.O
TO ALL RADIO AMATEURS BT

Satellite: AO-10
Catalog number: 14129
Epoch time:      93279.33702867
Element set:      82
Inclination: 27.1481 deg
RA of node:       2.4799 deg
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Eccentri{ty: 0.6019419
Arg of perigee:   119.8710 deg
Mean anomaly:     312.5993 deg
Mean motion:    2.05881755 rev/day
Decay rate:       -8.1e-07 rev/day^2
Epoch rev:            7754
Checksum: 322

Satellite: UO-11
Catalog number: 14781
Epoch time:      93290.08412027
Element set:      603
Inclination: 97.8032 deg
RA of node:       311.0490 deg
Eccentricity: 0.0011570
Arg of perigee:   334.0183 deg
Mean anomaly:      26.0441 deg
Mean motion:    14.69068128 rev/day
Decay rate:       2.74e-06 rev/day^2
Epoch rev:           51461
Checksum: 264

Satellite: RS-10/11
Catalog number: 18129
Epoch time:      93290.06201884
Element set:      803
Inclination: 82.9270 deg
RA of node:       148.5516 deg
Eccentricity: 0.0011614
Arg of perigee:   346.1410 deg
Mean anomaly:      13.9473 deg
Mean motion:    13.72324107 rev/day
Decay rate:       4.3e-07 rev/day^2
Epoch rev:           31656
Checksum: 273

Satellite: AO-13
Catalog number: 19216
Epoch time:      93291.97902075
Element set:      803
Inclination: 57.9233 deg
RA of node:       288.8083 deg
Eccentricity: 0.7215023
Arg of perigee:   326.4503 deg
Mean anomaly:       3.7960 deg
Mean motion:    2.09724992 rev/day
Decay rate:      -1.12e-06 rev/day^2
Epoch rev:            4095
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Checksum: 308

Satellite: FO-20
Catalog number: 20480
Epoch time: 93286.05864589
Element set: 601
Inclination: 99.0206 deg
RA of node: 119.8565 deg
Eccentricity: 0.0540673
Arg of perigee: 179.4597 deg
Mean anomaly: 180.7200 deg
Mean motion: 12.83221389 rev/day
Decay rate: -1.4e-07 rev/day^2
Epoch rev: 17243
Checksum: 315

Satellite: AO-21
Catalog number: 21087
Epoch time: 93294.05409391
Element set: 359
Inclination: 82.9442 deg
RA of node: 319.6850 deg
Eccentricity: 0.0036471
Arg of perigee: 32.4253 deg
Mean anomaly: 327.9130 deg
Mean motion: 13.74526370 rev/day
Decay rate: 5.7e-07 rev/day^2
Epoch rev: 13673
Checksum: 303

Satellite: RS-12/13
Catalog number: 21089
Epoch time: 93292.06028196
Element set: 604
Inclination: 82.9254 deg
RA of node: 190.2557 deg
Eccentricity: 0.0030765
Arg of perigee: 60.2849 deg
Mean anomaly: 300.1362 deg
Mean motion: 13.74027733 rev/day
Decay rate: 1.2e-07 rev/day^2
Epoch rev: 13553
Checksum: 286

Satellite: ARSENE
Catalog number: 22654
Epoch time: 93291.00444059
Element set: 528

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Inclination: 001.3462 deg
RA of node:       116.7185 deg
Eccentricity: 0.2926141
Arg of perigee:   157.0144 deg
Mean anomaly:     219.0546 deg
Mean motion:   01.42202871 rev/day
Decay rate:       .00000000 rev/day^2
Epoch rev:           00230
Checksum: 237

/EX

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Date: Fri, 22 Oct 1993 18:00:00 MDT
From: elroy.jpl.nasa.gov!usc!yeshua.marcam.com!zip.eecs.umich.edu!destroyer!
nntp.cs.ubc.ca!alberta!nebulus!ve6mgs!usenet@ames.arpa
Subject: ORBS$295.WT.AMSAT
To: ham-space@ucsd.edu

SB KEPS @ AMSAT  $ORBS-295.W
Orbital Elements  295.WEATHER

HR AMSAT ORBITAL ELEMENTS FOR WEATHER SATELLITES
FROM WA5QGD FORT WORTH,TX October 22, 1993
BID: $ORBS-295.W
TO ALL RADIO AMATEURS BT

Satellite: NOAA-9
Catalog number: 15427
Epoch time:       93290.74612187
Element set:      605
Inclination: 99.0870 deg
RA of node:       332.9651 deg
Eccentricity: 0.0014954
Arg of perigee:   179.9226 deg
Mean anomaly:     180.2097 deg
Mean motion:   14.13554165 rev/day
Decay rate:       -3.7e-07 rev/day^2
Epoch rev:          45608
Checksum: 326

Satellite: NOAA-10
Catalog number: 16969
Epoch time:       93290.82106501
Element set:      504
Inclination: 98.5150 deg
RA of node:       302.1917 deg
```

Eccentricity: 0.0012934
Arg of perigee: 321.7010 deg
Mean anomaly: 38.3214 deg
Mean motion: 14.24837161 rev/day
Decay rate: 1.22e-06 rev/day^2
Epoch rev: 36808
Checksum: 269

Satellite: MET-2/17
Catalog number: 18820
Epoch time: 93291.53530170
Element set: 203
Inclination: 82.5391 deg
RA of node: 100.8136 deg
Eccentricity: 0.0017013
Arg of perigee: 135.7781 deg
Mean anomaly: 224.4741 deg
Mean motion: 13.84695921 rev/day
Decay rate: 8.1e-07 rev/day^2
Epoch rev: 28891
Checksum: 293

Satellite: MET-3/2
Catalog number: 19336
Epoch time: 93291.49527421
Element set: 203
Inclination: 82.5404 deg
RA of node: 134.7206 deg
Eccentricity: 0.0017389
Arg of perigee: 143.8562 deg
Mean anomaly: 216.3716 deg
Mean motion: 13.16961690 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 25144
Checksum: 295

Satellite: NOAA-11
Catalog number: 19531
Epoch time: 93290.89200958
Element set: 404
Inclination: 99.1481 deg
RA of node: 269.2092 deg
Eccentricity: 0.0012760
Arg of perigee: 92.8710 deg
Mean anomaly: 267.3840 deg
Mean motion: 14.12923624 rev/day
Decay rate: 1.86e-06 rev/day^2
Epoch rev: 26100

Checksum: 296

Satellite: MET-2/18
Catalog number: 19851
Epoch time: 93291.60222170
Element set: 204
Inclination: 82.5195 deg
RA of node: 336.5279 deg
Eccentricity: 0.0013850
Arg of perigee: 179.8525 deg
Mean anomaly: 180.2646 deg
Mean motion: 13.84346937 rev/day
Decay rate: 7.7e-07 rev/day^2
Epoch rev: 23426
Checksum: 321

Satellite: MET-3/3
Catalog number: 20305
Epoch time: 93293.86376909
Element set: 905
Inclination: 82.5526 deg
RA of node: 76.2083 deg
Eccentricity: 0.0016064
Arg of perigee: 158.9218 deg
Mean anomaly: 201.2569 deg
Mean motion: 13.16023577 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 19163
Checksum: 307

Satellite: MET-2/19
Catalog number: 20670
Epoch time: 93291.36526602
Element set: 704
Inclination: 82.5469 deg
RA of node: 40.5451 deg
Eccentricity: 0.0017260
Arg of perigee: 103.8993 deg
Mean anomaly: 256.4088 deg
Mean motion: 13.84178196 rev/day
Decay rate: .00000000 rev/day^2
Epoch rev: 16716
Checksum: 299

Satellite: FY-1/2
Catalog number: 20788
Epoch time: 93294.21136422
Element set: 809

```
Inclination: 98.8528 deg
RA of node:      316.8038 deg
Eccentricity: 0.0014727
Arg of perigee:  321.8497 deg
Mean anomaly:     38.1620 deg
Mean motion:   14.01313955 rev/day
Decay rate:       3.54e-06 rev/day^2
Epoch rev:         16023
Checksum: 303

Satellite: MET-2/20
Catalog number: 20826
Epoch time:      93292.63746333
Element set:     704
Inclination: 82.5268 deg
RA of node:      337.3746 deg
Eccentricity: 0.0013989
Arg of perigee:    7.5076 deg
Mean anomaly:    352.6291 deg
Mean motion:   13.83561622 rev/day
Decay rate:       7.2e-07 rev/day^2
Epoch rev:         15449
Checksum: 320

Satellite: MET-3/4
Catalog number: 21232
Epoch time:      93292.47380663
Element set:     605
Inclination: 82.5446 deg
RA of node:      339.7727 deg
Eccentricity: 0.0014438
Arg of perigee:   70.5573 deg
Mean anomaly:    289.7107 deg
Mean motion:   13.16457107 rev/day
Decay rate:       4.3e-07 rev/day^2
Epoch rev:         11968
Checksum: 316

Satellite: NOAA-12
Catalog number: 21263
Epoch time:      93290.85535603
Element set:     809
Inclination: 98.6440 deg
RA of node:      318.6746 deg
Eccentricity: 0.0012273
Arg of perigee:  215.7022 deg
Mean anomaly:    144.3325 deg
Mean motion:   14.22324821 rev/day
```

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Decay rate:       2.015e-05 rev/day^2
Epoch rev:           12607
Checksum: 276


Satellite: MET-3/5
Catalog number: 21655
Epoch time:       93291.44033584
Element set:      604
Inclination: 82.5517 deg
RA of node:        287.4690 deg
Eccentricity: 0.0014163
Arg of perigee:     81.8750 deg
Mean anomaly:      278.3976 deg
Mean motion:    13.16824002 rev/day
Decay rate:         4.4e-07 rev/day^2
Epoch rev:            10464
Checksum: 303


Satellite: MET-2/21
Catalog number: 22782
Epoch time:       93289.84654493
Element set:      203
Inclination: 82.5486 deg
RA of node:         39.2666 deg
Eccentricity: 0.0022321
Arg of perigee:    183.8424 deg
Mean anomaly:      176.2567 deg
Mean motion:    13.82986914 rev/day
Decay rate:         3.0e-07 rev/day^2
Epoch rev:              645
Checksum: 324

/EX

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Date: 22 Oct 93 21:01:29 GMT
From: agate!howland.reston.ans.net!vixen.cso.uiuc.edu!uwm.edu!msuinfo!
netnews.upenn.edu!netnews.noc.drexel.edu!king.mcs.drexel.edu!pacs!rescon!wells!
beyonet!olwejo!bob@ames.arpa
Subject: Using Shuttle Elements in ephem
To: ham-space@ucsd.edu

I've been tring to get the STS orbital elements into ephem with some
success.  I think that I've got the right fields set, but the elements
are quite off when I compare them to posted ones.  The shuttle is at
the wrong place at a known time.
```

Thanks for your help.

```
--
  Bob Kupiec, N3MML    /\     Internet: beyonet!bob@vu-vlsi.ee.vill.edu
 Morrisville, PA, USA  \/             (or) bob@zero.com
40d12'N 74d49'W +110ft /\      AX.25: n3mml@wb3ftp.#epa.pa.usa.noam
"Motorola 68k Inside!" \/ 100% UNIX ~ PGP key 1F9C51 available ~ Get WiReD
```

Date: Sat, 23 Oct 93 16:57:38 CDT
From: dog.ee.lbl.gov!agate!howland.reston.ans.net!math.ohio-state.edu!
cs.utexas.edu!convex!constellation!wuntvor!grizbud@network.ucsd.edu
Subject: Using Shuttle Elements in ephem
To: ham-space@ucsd.edu

bob@olwejo.UUCP (Bob Kupiec) writes:

> I've been tring to get the STS orbital elements into ephem with some
> success. I think that I've got the right fields set, but the elements
> are quite off when I compare them to posted ones. The shuttle is at
> the wrong place at a known time.
>
> Thanks for your help.
>

Bob: Will geocentric elements work with EPHEM? I was under the impression
that Ephem would only work for heliocentric systems (comets, asteroids). Is
that incorrect?

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--
grizbud@wuntvor.pillar.com (Jim Gorges)
The Eternal Apprentice BBS, Oklahoma City, OK -- +1 405 942 8794
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End of Ham-Space Digest V93 #65
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